

WHAT IS CLAIMED IS:

1. A method for identifying, in a non naturally-occurring viral genome, a viral gene required for capsid assembly, said method comprising:

5 isolating nucleic acid putatively encoding said viral gene from said viral genome;
programming a cell free translation system with said nucleic acid; and
determining that capsid assembly has occurred as an indication that said viral gene is required for capsid assembly.

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2. A composition comprising:

isolated nucleic acid from a non-naturally occurring viral genome encoding a viral gene required for capsid assembly.

15 3. A method for identifying a compound that inhibits capsid assembly of a non naturally-occurring virus, said method comprising:

20 programming a cell free translation system with nucleic acid encoding a protein required for capsid assembly of said non naturally-occurring virus in the presence and absence of said compound; and

25 determining whether capsid assembly has occurred as an indication as to whether said compound inhibits capsid assembly , wherein inhibition of capsid assembly is inferred from a change selected from the group consisting of (a) a change in distribution of assembly intermediates in the cell-free system; (b) a change in localization of host proteins in the cell-free system on glycerol or sucrose gradients; (c) a change in distribution of assembly intermediates in cells; (d) a change in level of assembly intermediates produced in cells; and (e) a change in co-localization of host protein and capsid protein in cells as observed during viral infection.

30 4. A composition comprising:

a compound identified according to the method of Claim 3, wherein capsid assembly is inhibited in the presence of said compound.

5. A method for obtaining one or more host proteins that interact with one or more viral proteins required for capsid assembly of a non naturally-occurring virus, said method comprising:

programming a cell free translation system with nucleic acid encoding one or more protein required for capsid assembly of said non naturally-occurring virus whereby translation products for said one or more capsid proteins are produced;

10 incubating said translation mixture for a period of time sufficient for said translation products to assemble into one or more capsid intermediates, wherein said one or more capsid intermediates each comprise a complex of polymerized viral capsid protein and a host protein;

isolating said one or more capsid intermediates; and

15 dissasociating said one or more capsid intermediates whereby said one or more host proteins are obtained.

6. A capsid intermediate comprising a host protein obtained according to the method of Claim 5.

20 7. A host protein obtained according to the method of Claim 5.

8. A human homologue of a host protein obtained according to the method of Claim 7.

25 9. Antibodies to a host protein according to Claim 7.

10. The antibodies according to Claim 9, wherein said antibodies inhibit binding of a host protein to one or more viral proteins required for capsid assembly of a non naturally-occurring virus.

30 11. A method of obtaining a capsid intermediate involved in assembly of a non naturally-occurring virus, said method comprising:
combining a nucleic acid enoding a viral gene required for capsid assembly

with a cell-free protein translation mixture;

incubating said mixture for a period of time sufficient to assemble translation products of said viral gene into viral capsid intermediates;

5 separating said translation mixture into fractions of one or more capsid intermediates; and

isolating said one or more capsid intermediates whereby capsid intermediates of said non-naturally occurring virus are obtained.

10 12. A method of identifying host proteins involved in capsid assembly of a non naturally-occurring virus, said method comprising:

denaturing host proteins obtained according to the method of Claim 5;

sequencing said individual host proteins, and

15 comparing the sequences of said individual host proteins to known sequences of host proteins, whereby the identity of host proteins that are involved in capsid assembly of said non naturally-occurring virus are obtained.

13. A method for identifying compounds that interfere with capsid assembly of a non naturally-occurring virus, said method comprising:

20 expressing a protein required in said capsid assembly in a mammalian cell;

identifying co-localization of said protein and one or more host protein using immunofluorescence in said mammalian cells; and

25 screening compounds for those that interfere with co-localization of said protein required in said capsid and said one or more host protein in said mammalian cells, whereby compounds that interfere with capsid assembly are identified by a change from co-localization of said immunofluorescence to a diffuse staining pattern.

30 14. The method according to Claim 13, wherein said compounds do not cause toxicity or upregulate host stress proteins in said mammalian cells.

15. A method of identifying a compound that inhibits capsid assembly of a non naturally-occurring virus, said method comprising:

adding a test compound to a cell-free translation mixture programmed with nucleic acid from virus encoding one or more protein required for capsid assembly whereby capsids are produced;

comparing assembly in the absence of said test compound to assembly in

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presence of said test compound, wherein less assembly measured in the presence of said compound is indicative of a compound that inhibits capsid assembly.

16. The method according to Claim 15, wherein said compound is a small molecule.

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17. A method of inhibiting capsid formation in a cell of a non naturally-occurring virus, said method comprising:

providing to said cell a compound selected according to the method of
Claim 15.

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18. The method according to Claim 17, wherein said cell is a human cell.

19. The method according to Claim 15, wherein said compound is an anti-capsid antibody.

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20. A method for treating symptoms, in an animal in need thereof, of a bioterrorist attack with an unknown viral agent, said method comprising:

isolating nucleic acid putatively encoding a viral gene involved in capsid assembly from said viral genome;

25 programming a cell free translation system with said nucleic acid for a period of time sufficient to assemble translation products of said viral gene into viral capsid intermediates;

separating said translation products into fractions of one or more capsid intermediates;

30 isolating said one or more capsid intermediates;

separating said capsid intermediates to obtain one or more host proteins that were bound to one or more viral protein in said capsid intermediates;

comparing a biochemical characteristic of said individual one or more host

proteins to a library comprising biochemical characteristics of a plurality of viral capsid assembly chaperones individually cross-referenced with one or more small molecules that inhibit interaction between an individual member of said library and a viral capsid protein; and

5 providing said animal with a small molecule cross-referenced with an individual member of said library having a biochemical characteristic in common

with said one or more host protein, whereby said symptoms are treated.

10 21. The method according to Claim 20, wherein said biochemical characteristic is an amino acid sequence of a binding region for a viral capsid protein.

22. The method according to Claim 21, wherein said animal is a mammal.

15 23. The method according to Claim 21, wherein said mammal is a human.

24. A method for producing viral capsids of a non-naturally occurring virus, said method comprising:

20 programming a cell free translation system with said nucleic acid from said virus; and

incubating said translation mixture for a period of time sufficient for said translation products to assemble into capsids; and

isolating said capsids.

25 25. Antibodies to viral capsids of a non-naturally occurring virus.

26. The antibodies according to Claim 25 wherein said antibodies are monoclonal antibodies.